1.Features

- Single fiber bi-directional data links asymmetric
- TX 2488Mbps/RX1244Mbps application
- 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- Small Form Factor Pluggable package
- with SC/UPC Connector
- Reset burst-mode receiver design support more
- than 15dB dynamic range
- Single 3.3V power supply
- Digital diagnostic monitoring interface
- Digital burst RSSI function to monitor the input optical power level
- LVPECL compatible data input/output interface
- LVTTL transmitter disable control
- LVTTL transmitter laser fault alarm
- LVTTL receiver Signal Detect (SD) indication
- Low EMI and excellent ESD protection
- Class I laser safety standard IEC-60825 compliant
- operating case temperature：

  Standard: 0℃~+70℃
- RoHS 2.0 compliance

2.Applications

- Gigabit-capable Passive Optical Networks (GPON) 20Km 29~41dB attenuation range.

3.General

The GPON OLT Transceiver module is designed for Gigabit Ethernet Passive Optical Network（GPON）20km transmission. The module incorporates 1490nm continuous-mode transmitter and 1310nm burst-mode receiver. The transmitter section uses a 1490nm DFB laser and an integrated laser driver which is designed to be class-1 eye safe under any single fault. The laser driver includes APC and temperature compensation functions, which are used for keeping the launch optical power and extinction ratio constant over temperature and aging.

The receiver section uses an integrated APD and BM-preamplifier mounted together. The burst-mode receiver is restless and wide dynamic range is 29~41dB that can be obtained under whole operating conditions. The module has the function that indicates receiver burst-power-detect signal. The receiver includes digitalized burst mode optical power monitoring function, which converses any of a received ONU optical power directly in digital, with a Trigger input from system. When rising edge of Trigger detected, the DDM processor starts a burst optical power conversion, the digital result is available via DDM interface after Burst Optical Power Conversion Time. Trigger pulse width should be more than Burst Optical Power Conversion Holding Time. An integrated WDM coupler can distinguish 1310nm input light from 1490nm output light. The metallic package guarantees excellent EMI and EMC characteristics.

4.Order Information

Table-1-Order Information (Standard: 0℃~+70℃)

Part Number	Data Rate (TX/RX)	Index level	PO (dBm)	Sens (dBm)	Interface	Temp.[Note 1]
WGLS-4121-51CSS[Note 2]	2.488G/1.244G	D1	+7~+10	≤-32	SC	0℃~+70℃
WGLS-4121-52CSS[Note 2]	2.488G/1.244G	D2	+9~+10	≤-32	SC	0℃~+70℃

Note:
1.The Temp is Operating Case Temperature Range.
2.Receiver Signal Detected
S:RX-SD (RX-SD=0:signal loss RX-SD=1:signal valid);
L:Rx-LOS (RX-LOS=0:signal valid RX-LOS=1:signal loss).

5. Absolute Maximum Ratings

Table 2-Absolute Maximum Ratings

Parameter	Condition	Unit	Min.	Typ.	Max.
Supply Voltage		V	-0.5	-	3.6
Storage Temperature	Case Temperature	℃	-45	-	90
Relative Humidity, Storage	None Condensing	%	5	-	95
Rx Total Optical Power	Damage Threshold	dBm	-	-	-8

6. Operating Environment

Table 3-Operating Environment

Parameter	Condition	Unit	Min.	Typ.	Max.
Power Supply Voltage		V	3.13	3.3	3.47
Operating Case Temperature	Standard	℃	0	-	70
	Industrial	℃	-40	-	85

*Exceeding any one of these values may destroy the device immediately.

7. Electrical Characteristics

Table 4-Electrical Characteristics

Parameter		Symbol	Min	Type	Max	Units	Notes
Transmitter							
Differential Data Input Swing		Vin	200	-	2400	mVpp	1
Input Differential Impedance		Zin	90	100	110	ohm	
Tx_Disable	Disable	VD	2.0	-	VCC	V	
	Enable	VEN	GND	-	GND+0.8	V	
TX_ Fault	Fault	VF	2.0	-	VCC	V	
	Normal	VNO	GND	-	GND+0.8	V	
Receiver							
Differential Date Output Swing		Vout	800	-	1500	mVpp	2
Output Differential Impedance		Zout	90	100	110	ohm	
Rx_Los	Los Signal	VOH	2.0	-	VCC	V	
	Normal Operation	VOL	GND	-	GND+0.4	V	

Note:
1.Internally AC coupled, input termination may be required for LVPECL/CML applications.
2.Internally DC coupled, LVPECL/CML differential output stage.

8. Specifications

Table 5-Optical Characteristics

Parameter	Symbol	Units	Min.	Typ.	Max.	Notes
Transmitter						
Optical Center Wavelength	λC	nm	1480	1490	1500	
Optical Spectrum Width (-20dB)	Δλ	nm	-	-	1	
Side Mode Suppression Ratio	SMSR	dB	30	-		
Power-OFF Transmitter Optical Power		dBm	-	-	-39	3
Extinction Ratio	ER	dB	5	-	-	4
Tolerance to Transmitter Incident Light		dB	-15	-	-	
Transmitter Reflectance		dB	-	-	-10	
Transmitter and Dispersion Penalty	TDP	dB	-	-	1	
Optical Waveform Diagram	ITU-T G.984.2					Figure 1
Parameter	**Symbol**	**Unit**	**Min**	**Typ.**	**Max**	**Notes**
Receiver						
Operating Wavelength	λC	nm	1260	1310	1360	
Saturation Optical Power	P_{SAT}(D1)	dBm	-15	-	-	5
	P_{SAT}(D2)	dBm	-15	-	-	5

Signal Detect Assert Level	SDA	dBm	-	-	-34	5
Signal Detect De-Assert Level	SDD	dBm	-45	-	-	5
Signal Detect Hysteresis		dBm	0.5	-	6	
Receiver Reflectance		dB	-	-	-12	
Data Output Voltage - Low（-Vcc）		V	-1.81	-	-1.62	
Data Output Voltage - High（-Vcc）		V	-1.02	-	-0.88	
Data Output Differential Swing		mV	400	-	1600	7
Guard time	TGUARD	bits	-	32	-	
Reset width	TRESET	bits	-	16	-	
Receiver Amplitude Recovery Time	TRECOVERY	bits	-	24	32	8
Signal Detect de-assert Time		ns	-	-	12.8	
Signal Detect assert Time		ns	-	-	50	9
Signal Detect Voltage-Low		V	0	-	0.4	
Signal Detect Voltage-High		V	2.4	-	Vcc	
RSSI Trigger-Low		V	0	-	0.8	
RSSI Trigger-High		V	2.0	-	Vcc	
Optical Signal During Time	TONT EN_DUR	ns	300	-	-	10
RSSI Trigger Delay	TD	ns	0	-	3000	11
RSSI Trigger width	TW	ns	300	-	TONTEN_ DUR- TD	
I2C Access Prohibited Time		us	100	-	500	

Note:

1.BOL, Normal Temperature.

2.EOL, Over Temperature.

3.Launched into SMF

4.PRBS 223-1+72CID @2.488Gbit/s

5.PRBS 223-1+72CID@1244Mbps BER ≤1×10^{-10}.

6.Figure 2.

7.LVPECL output, DC coupled .

8. Refer to the Reset signal falling edge.

9.Refer to the Reset signal rising edge

10.For RSSI Measurement

11.Refer to first bit of the preamble

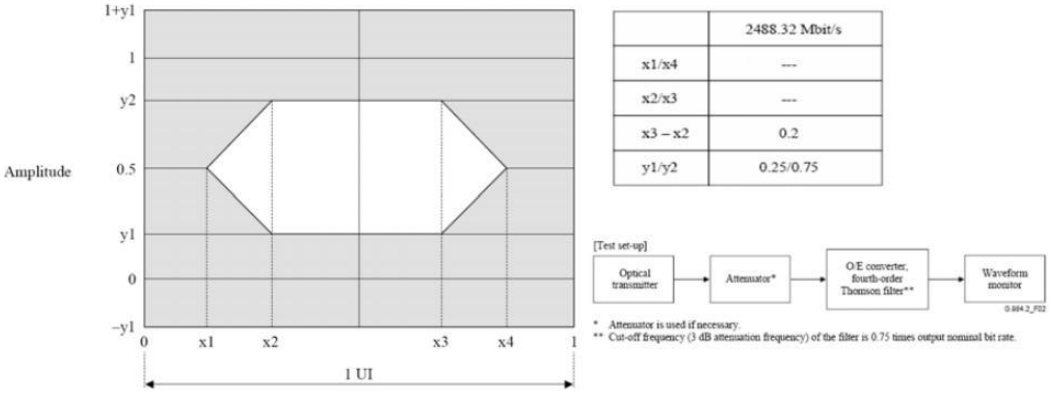

Figure 1, Transmitter Eye Mask Definitions and Test Procedure

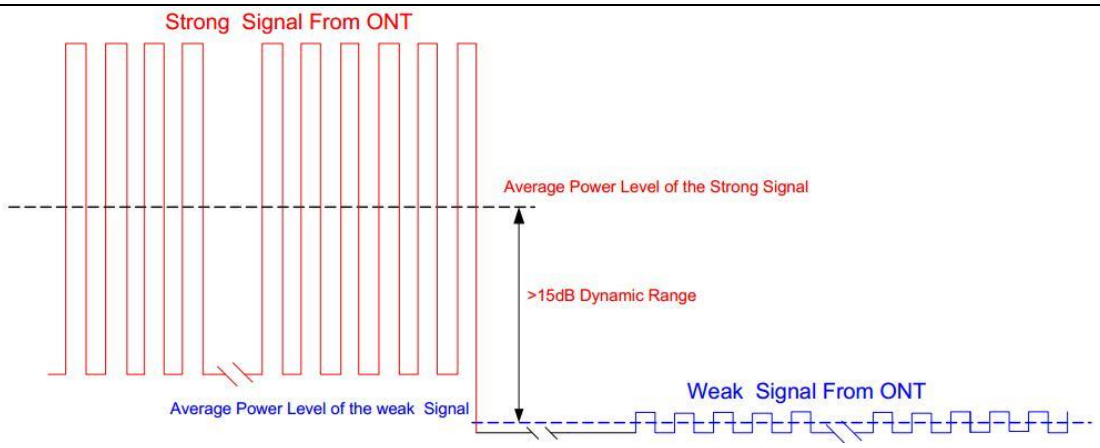

Figure 2, Burst Mode Receiver Dynamic Range in GPON System

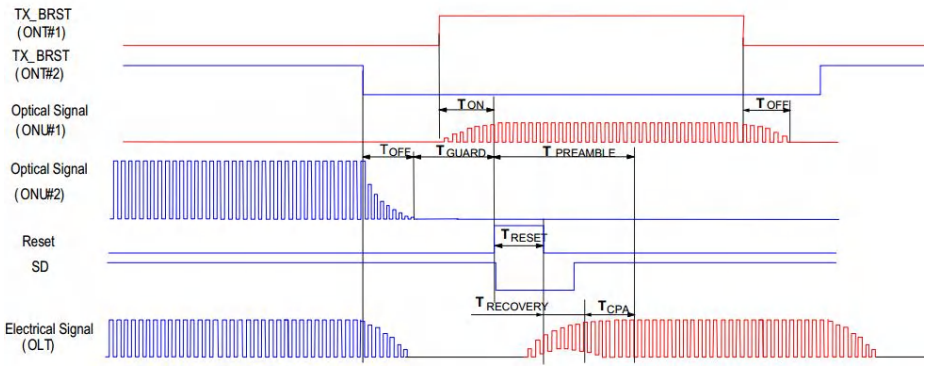

Figure 3, Burst Receiver Timing Sequence

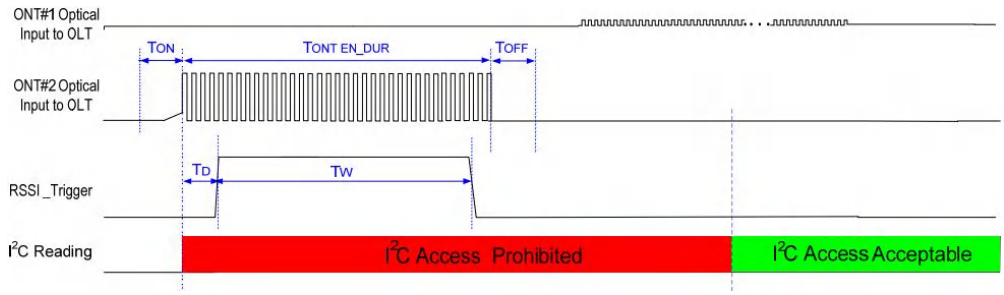

Figure 4, RSSI Timing Sequence

9. Digital Diagnostic Memory Map

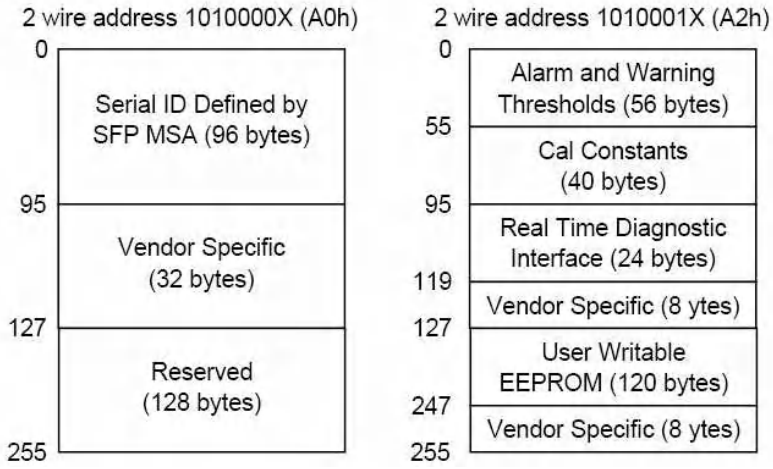

Figure 5, Memory map

10. Pin arrangement

Table 6-Connector Pin Assignment

Pin	Name	Description	Notes
1	VeeT	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	High: abnormal; Low: normal
3	TX Disable	Transmitter Disable	High: transmitter disable;Low: transmitter enable
4	MOD-DEF2	Module Definition 2	The data line of two wire serial interface
5	MOD-DEF1	Module Definition 1	The clock line of two wire serial interface
6	MOD-DEF0	Module Definition 0	Connected to Ground in the transceiver
7	Reset	Receiver Reset	High: reset the receive
8	SD	Signal Detect	High: signal detected; Low: loss of signal
9	RSSI Trigger	RSSI Trigger for Transceiver A/D	High: enable RSSI A/D conversion
10	VeeR	Receiver Ground	
11	VeeR	Receiver Ground	
12	RD-	Inverse Received Data out	LVPECL logic output, DC coupled
13	RD+	Received Data out	LVPECL logic output, DC coupled
14	VeeR	Receiver Ground	
15	VccR	Receiver Power —— +3.3V±5%	
16	VccT	Transmitter Power —— +3.3 V±5%	
17	VeeT	Transmitter Ground	
18	TD+	Transmitter Data In	LVPECL logic input, AC coupled
19	TD-	Inverse Transmitter Data In .	LVPECL logic input, AC coupled
20	VeeT	Transmitter Ground	

11.Block Diagram

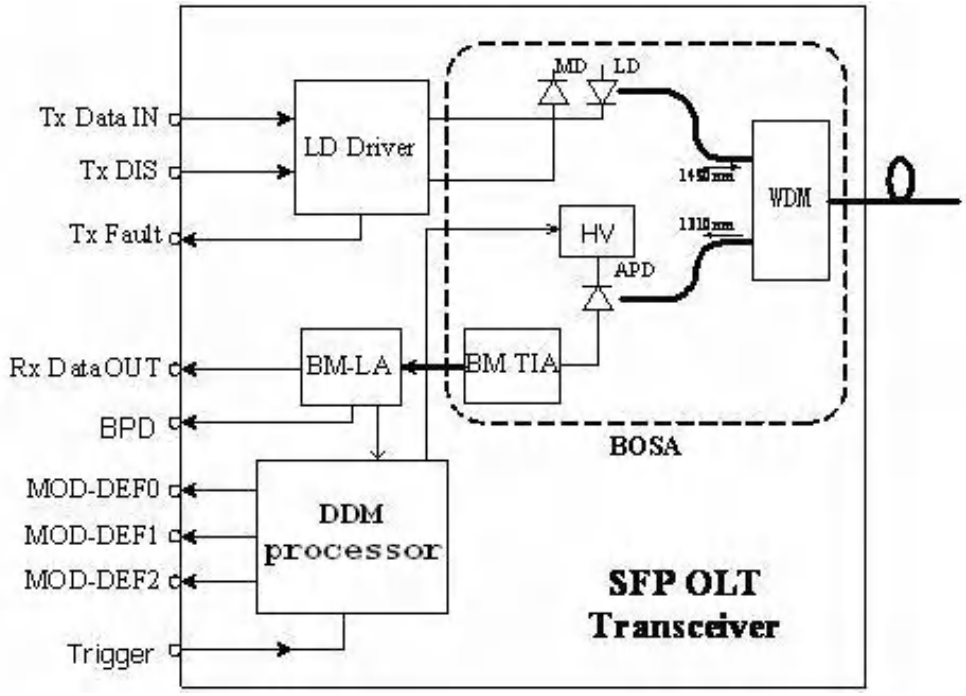

Figure 6, Block Diagram

12.Typical Application Circuit

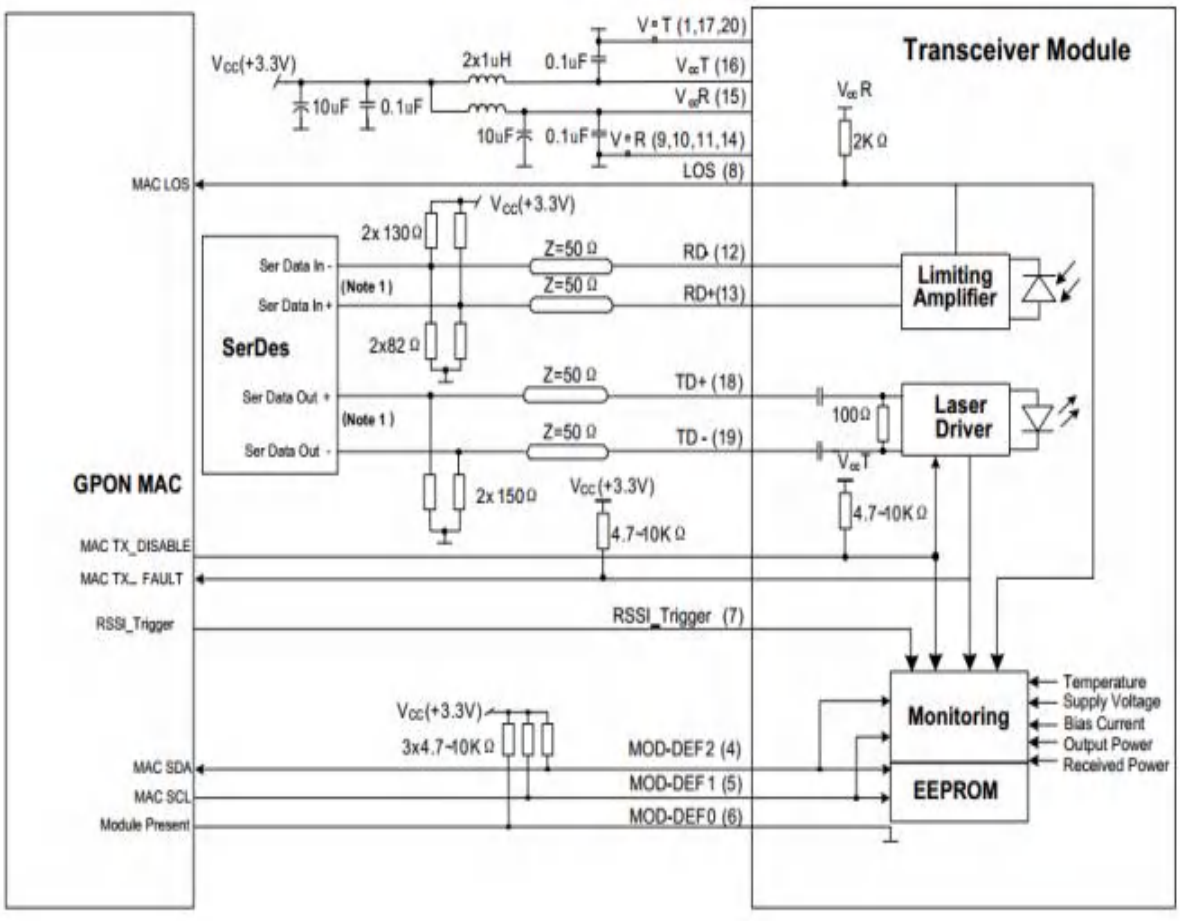

Figure 7,Typical Application Circuit

13.Mechanical Information

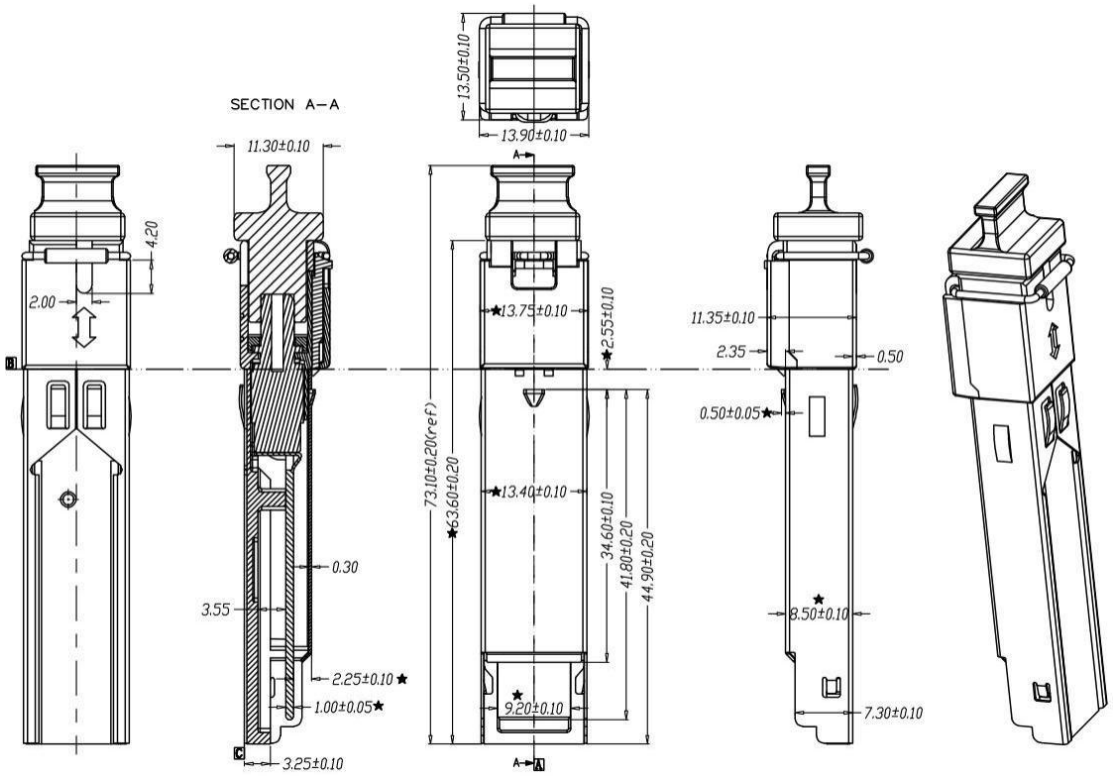

Figure 8, Mechanical Information

14. Regulatory Information

Table 7-List of Regulatory/Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883H Method 3015.8	Based on HBM
	IEC61000-4-2	8kV Contact Discharge 15kV Air Discharge
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compatible with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compatible with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product.
RoHS 2.0	2011/65/EU	Compliant with standards

15.Notice

Gigac reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only. Gigac makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

16.Revision History

Version	Initiated	Reviewed	Revision History	Release Date
A0	Fei.Han	Smith.Xu	Initialization	2020-03-16